Active Project (2016 - 2016)

Durable Icephobic Cellulose Nanopaper Composite for Aircraft Icing Mitigation, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

Existing aircraft ice protection systems operate at the expense of other payload and add significant weight, power requirements, system complexity, or cost. A completely passive technology that would prevent ice accretion is highly desired, but no known technique has reached a level of effectiveness, durability and cost-efficiency to merit commercialization. Helicity Technologies proposes to integrate our proprietary icephobic liquid into a durable, easily renewable, environmentally friendly, icephobic composite that does not distort airflow and adds negligible weight. In Phase I, we will develop a cellulose nanopaper base layer for the storage and replenishment of our functional fluid to dramatically extend its useful life. Methods for increasing cellulose nanopaper strength and elasticity, and improved control of porosity will be explored. The resulting icephobic composite prototype will be tested for performance under simulated icing conditions in an icing wind tunnel.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: Our proposed technology has broad applicability across NASA's Aeronautics Research Mission Directorate (ARMD) and is especially relevant to the Airspace Operations and Safety Program and Advanced Air Vehicles Program. When fully developed, our technology can provide continuous, lightweight, rain-erosion resistant icing protection without adding manufacturing complexity or affecting payload for fixed and rotary wing vehicles. Our proposed technology is also in close alignment with NASA's Unmanned Aerial Systems (UAS) research. By mitigating the hazards of flight into icing conditions, our technology will dramatically increase options for flight path, range, altitude and duration of unmanned missions.

To the commercial space industry:

Potential Non-NASA Commercial Applications: Icephobic

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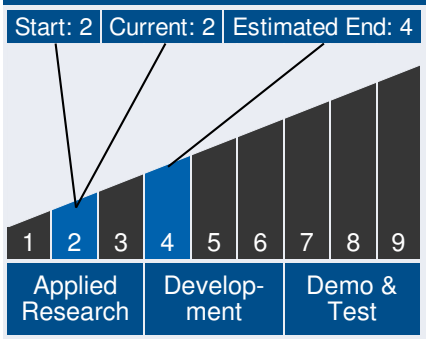
Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

Continued on following page.

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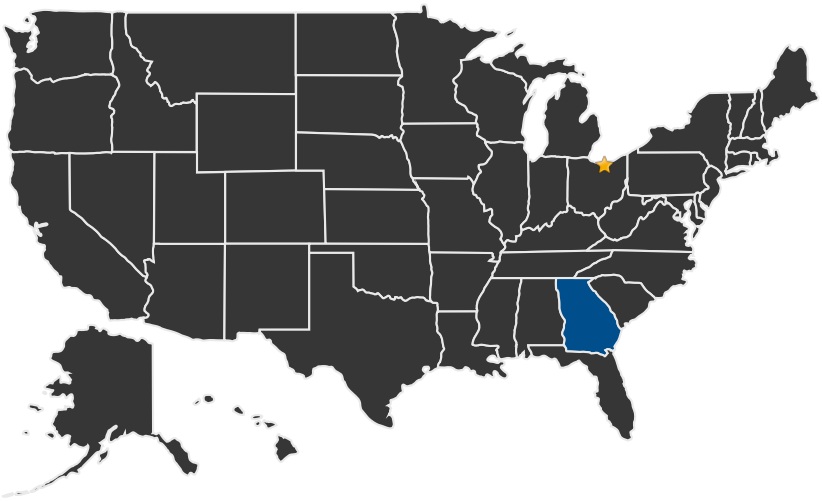
coatings have numerous potential commercial applications within civil aviation, rail, wind energy, maritime transport, and logistics industries. Potential applications include airframes, rail infrastructure, railcars, switches, wind turbines, shipboard structures, and transit equipment. An economical, reliable, readily renewable, and long-lasting passive anti-icing solution could potentially improve the overall safety, performance, and efficiency of the future transportation system.

U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Glenn Research Center

Other Organizations Performing Work:

- Helicity Technologies (Acworth, GA)

PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23350)

Management Team *(cont.)*

Principal Investigator:

- Liang Wang

Technology Areas

Primary Technology Area:
Materials, Structures, Mechanical Systems and Manufacturing (TA 12)

IMAGE GALLERY

Durable Icephobic Cellulose Nanopaper Composite for Aircraft Icing Mitigation, Phase I

DETAILS FOR TECHNOLOGY 1

Technology Title

Durable Icephobic Cellulose Nanopaper Composite for Aircraft Icing Mitigation, Phase I

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